

European Deep Underground Laboratories







On behalf of the European DULs WG

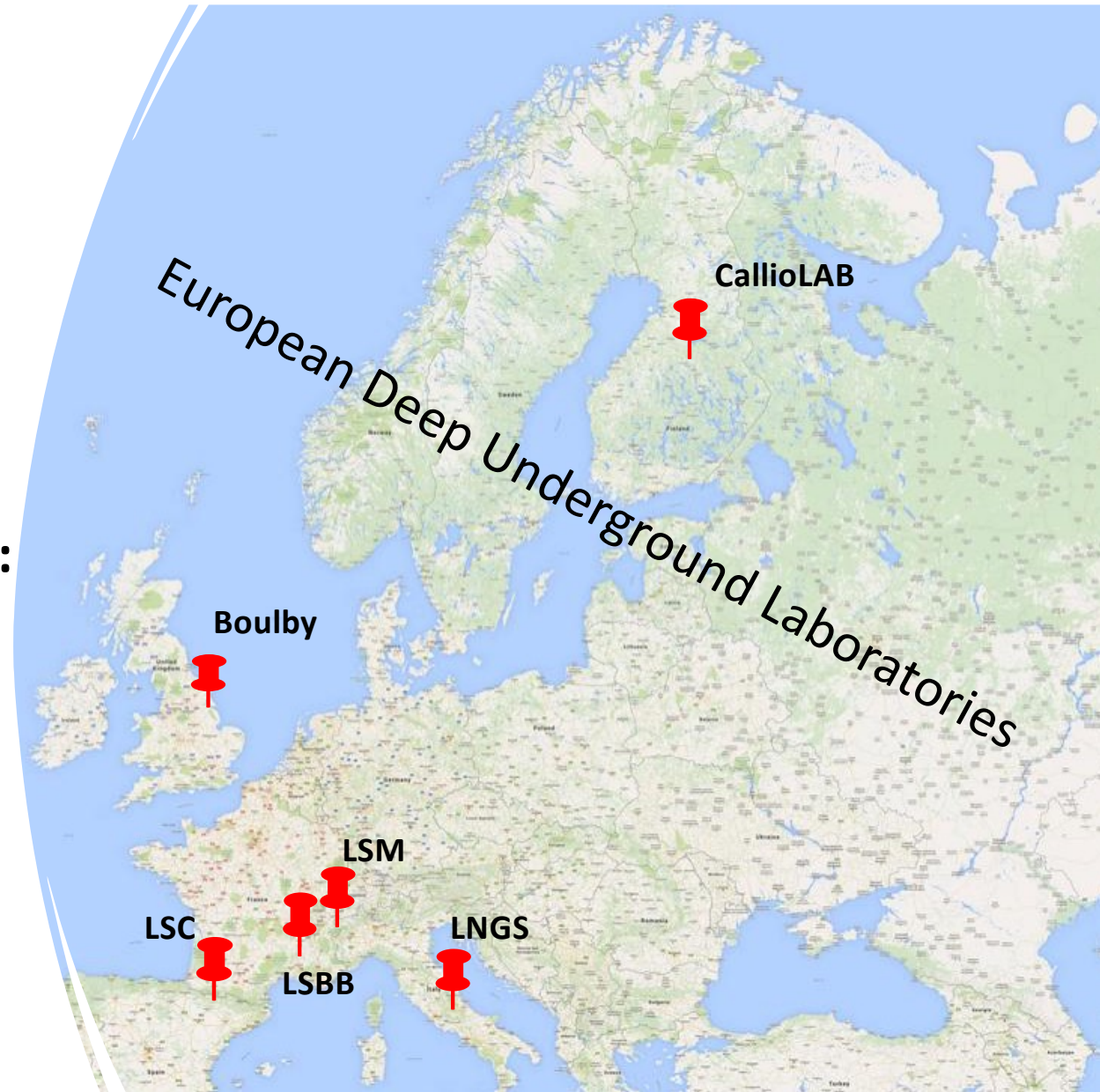
APPEC GA
Dec 7th, 2023
Brussels, Belgium



Current Working Group members for EU ULs

European Deep Underground Labs: WG for coordination activity

-  LNGS, Ezio Previtali and Aldo Ianni (also in APPEC JS)
-  LSC, Carlos Peña Garay (also in APPEC GA and JS)
-  LSM, Jules Gascon
-  LSBB, Ignacio Lázaro
-  Boulby, Sean Paling
-  CallioLab, Julia Puputti

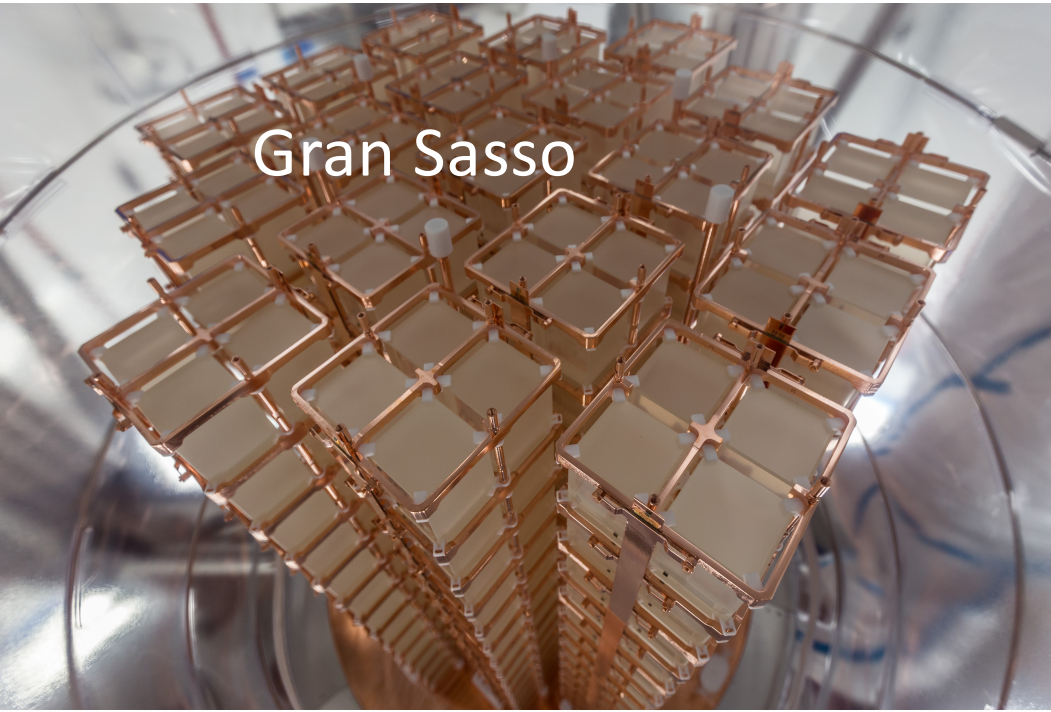


European Deep Underground Laboratories are
unique **Research Infrastructures**

and

a unique opportunity for Europe

Gran Sasso



Modane



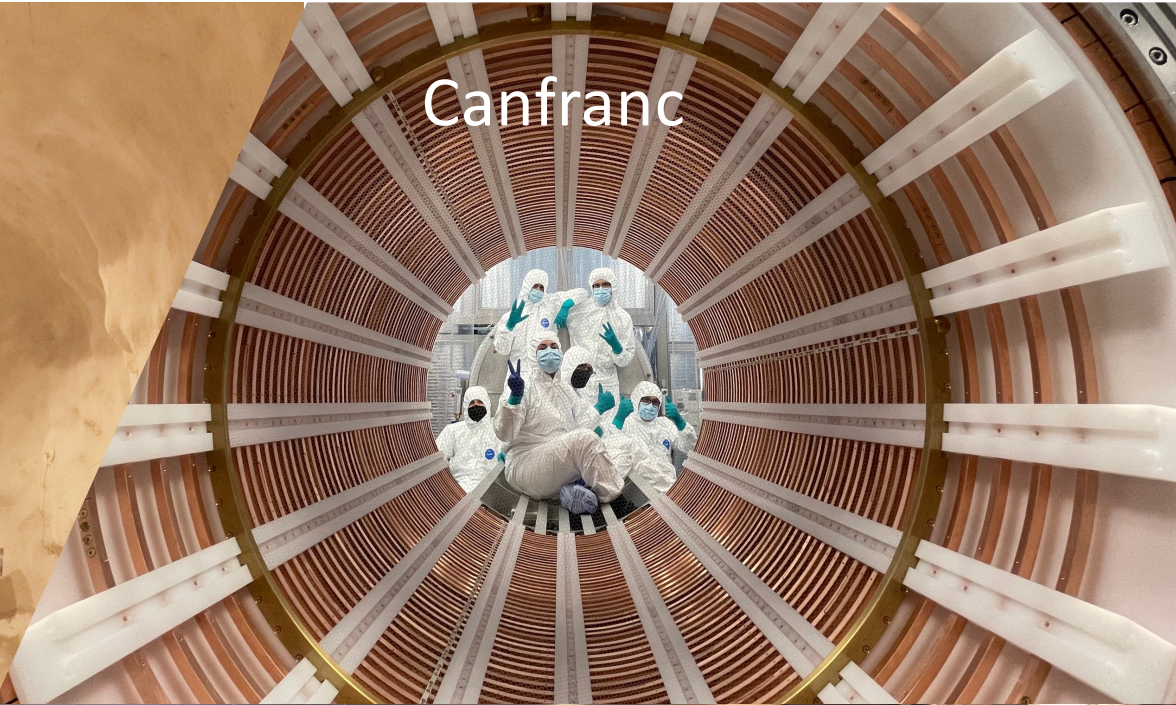
Boulby



CLAB



Canfranc



LSBB



Our mission, vision, and essentials for success


Maintain and enhance European leadership by coordinating Deep Underground Laboratories (DULs)

Build an effective Transnational Access (TA) network to train and retain talent in Europe.

Our success depends on better suited EU calls for financial support.

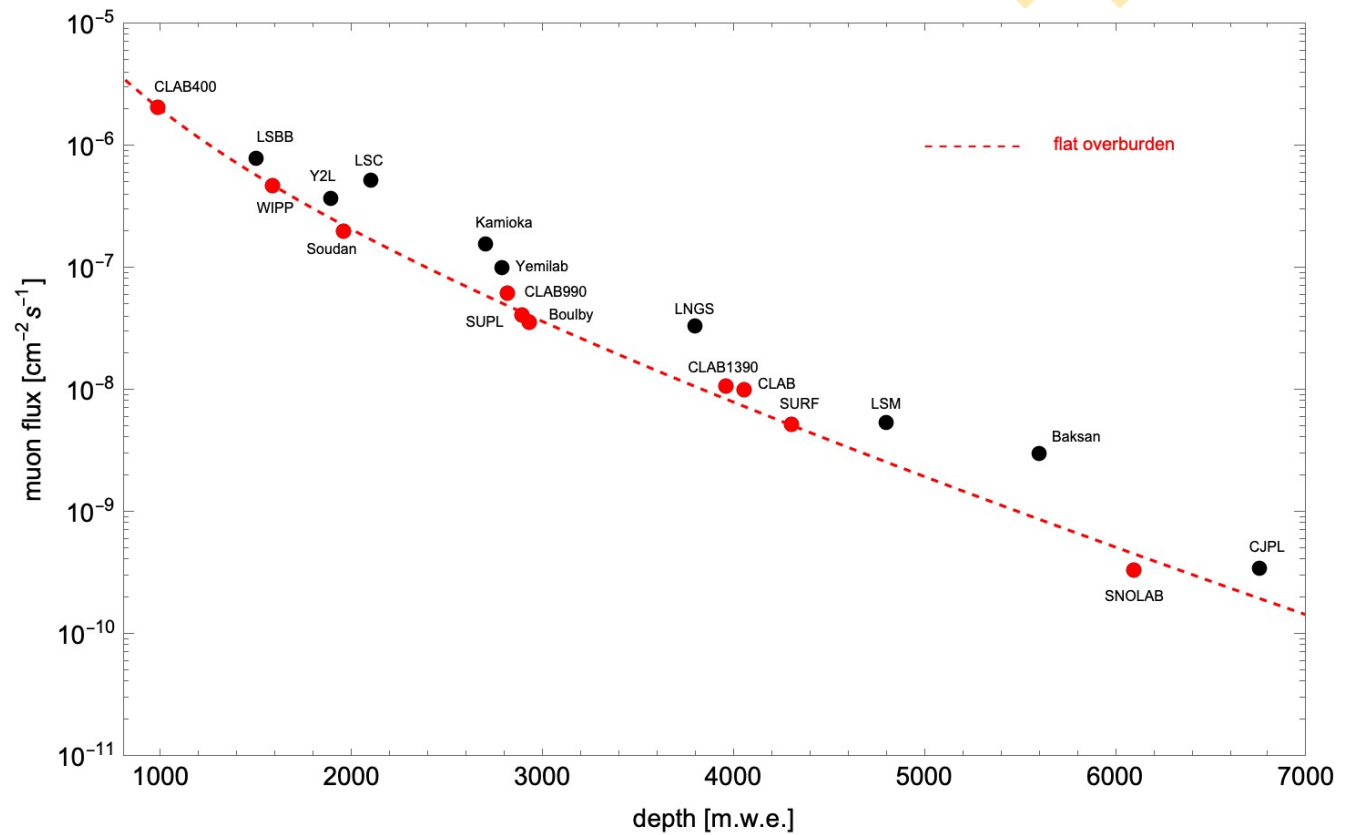
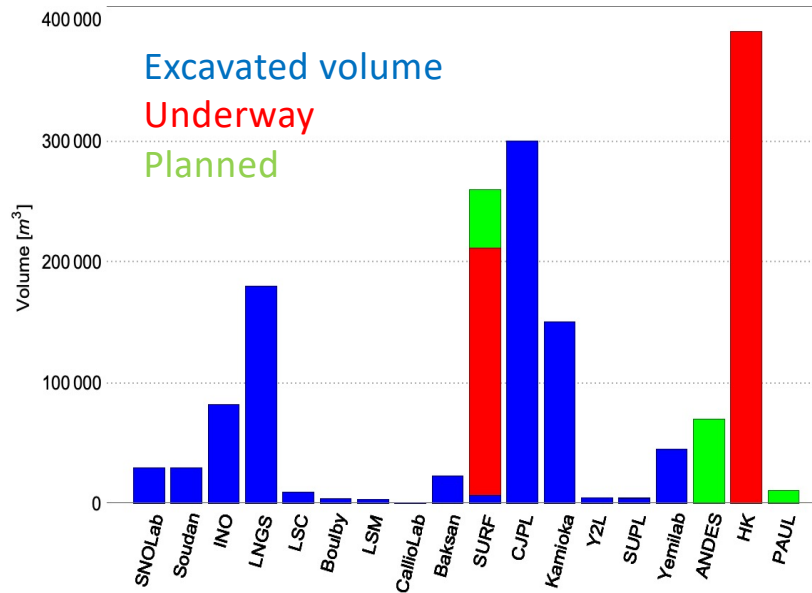
DULs around the world



 operational  new proposal  not operational

DULs world-wide: differences, complementarities and multi-disciplinary

complementarity and synergy
is developed in a number of
parameters including depth



Main goals

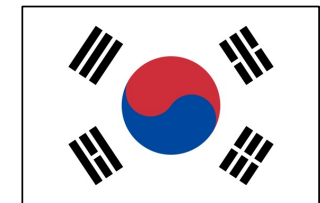
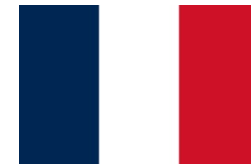
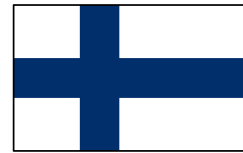
Foster	Foster coordination and synergy between DULs as critical Research Infrastructures
Coordinate	Coordinate ULs strategy for future investments
Establish	Establish a European transnational access (TA) policy
Reinforce	Reinforce cooperation and coordination in key services to support next-generation experiments
Connect	Connect existing facilities through a Virtual Coordination Office to support research and optimize synergy

Going global: extended Working Group

- Established during TAUP 2023
- Current activity: survey of main characteristics, organization, and facilities

- Representative

- Boulby (UK): Sean Paling
- CLAB (Finland): Julia Puputti
- CLPL (China): Qian Yue
- LNGS (Italy): Aldo Ianni
- LSBB (France): Gilles Micolau
- LSC (Spain): Carlos Pena Garay
- LSM (France): Jules Gascon
- SNOLAB (Canada): Jeter Hall
- SUPL (Australia): Kim Mintern-Lane
- SURF (USA): Jaret Heise
- Yemilab (South Korea): Kang-Soon Park
- ANDES (Argentina): Xavier Bertou



Achievements and ongoing actions

Working Group has
been in active
operation since 2021

- 1st common **Workshop** at LNGS in 2022 (<https://agenda.infn.it/event/30742/>)
- Participation to **APOGEIA** proposal (framework: HORIZON-INFRA-2022-TECH)
- Participation to **2023 COST Action: A network for Science and Technology for Underground Research of rare events**
 - **EU ULs plus:** **Germany:** Daniel Bemmerer (Felsenkeller). **Portugal:** Cristina Maria Bernardes Monteiro (LIBPhys-UC). **Romania:** Alexandru Gherghel-Lascu (IFIN-HH). **Poland:** Leszek Roszkowski (Copernicus Astronomical Center); Grzegorz Zuzel (Jagiellonian University). **Czech Republic:** Ivan Stekel (Technical University Prague); Marie Davídková (National Radiation Protection Institute). **Ukraine:** Fedor Danevich (Institute for Nuclear Research). **Slovakia:** Fedor Simkovic (Faculty of Mathematics, Physics and Informatics, Bratislava); Martin Plesch (Institute of Physics, Bratislava). **Serbia:** Dejan Joković (Institute of Physics Belgrade)
- Establish **TA and Reseach Coordination** agreements between Laboratories
- **Dissemination:** coordination of publications on specific activities in ULs worldwide (editorial board: LNGS, LSC, Boulby, SNOLAB)
 - ✓ Frontiers: *Science and Technology in DULs*
- Dedicated Session to DULs coordination in **TAUP 2023** meeting (<https://lpsc-indico.in2p3.fr/event/3363/>)
- Inclusion in **APPEC Roadmap**



1st Workshop on EU DULs

The Workshop aims to reinforce the network between EU Underground Laboratories in order to develop a strong synergy to face next generation experiments for rare events searches. The meeting will focus on reviewing the existing facilities and planned new ones for supporting research activities, strategy for collaboration and work load sharing, training and networking, interaction with the APPEC community.

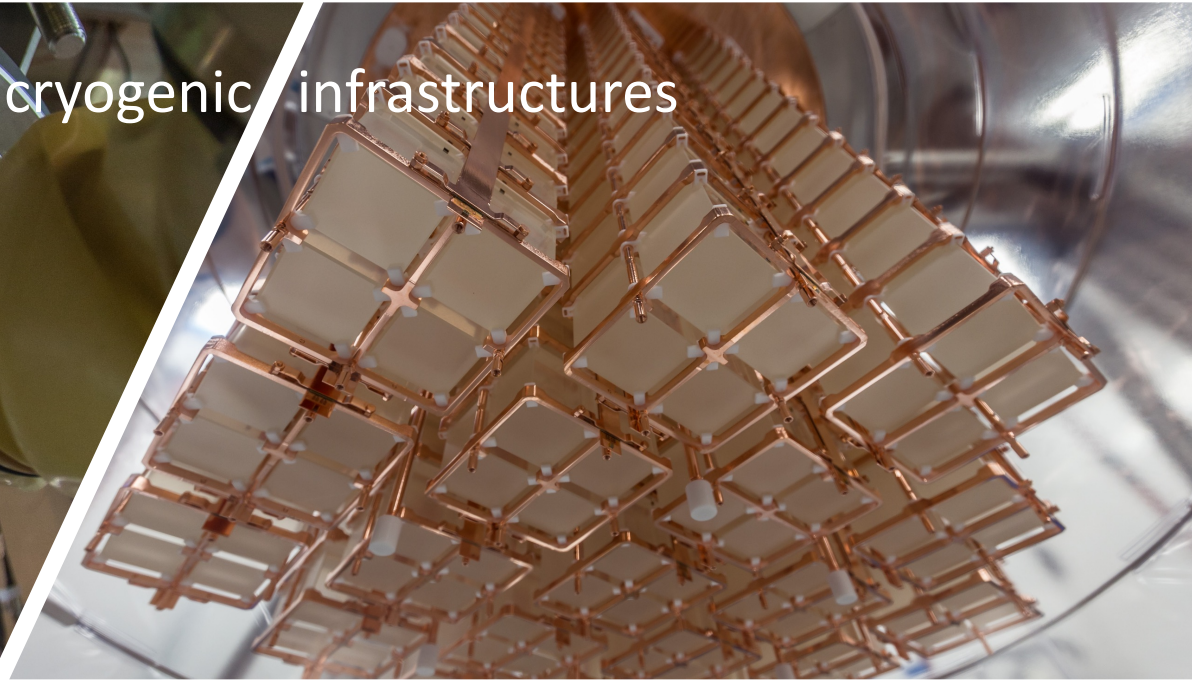
An overview of research infrastructures by the different Laboratories is planned together with dedicated talks on main common research activities between Laboratories. A final round table to discuss common interests and future perspectives in synergy with APPEC representatives is organized.

Summary of round table discussion

The Directors/Representatives of the European Underground Laboratories participating in the meeting agreed on initiating regular Lab Director's meetings, inclusive to other Underground Laboratories, to evaluate the current situation and plans on common services and activities and to identify future actions of common interest.



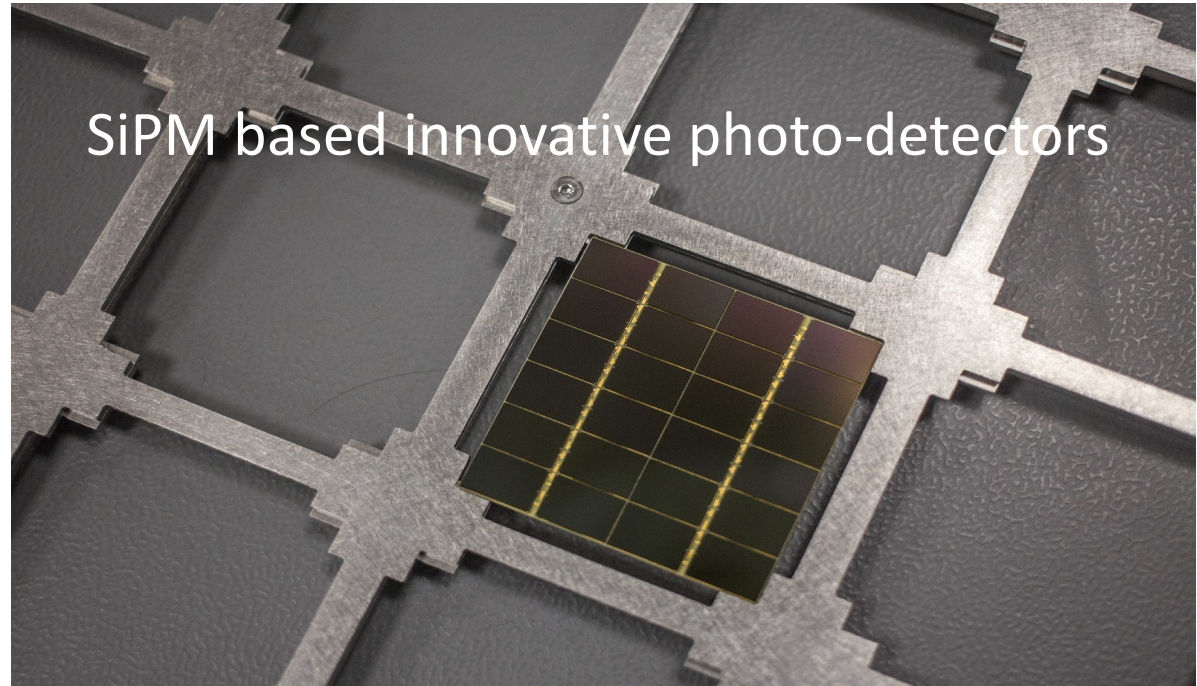
New advanced technologies for cryogenic infrastructures



New technology for Rn-free environments



Superconducting sensors in ultra-low background environments for quantum computing



SiPM based innovative photo-detectors



Safety and engineering in DULs

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Thank you for your attention

Good science usually spreads its influence far and wide,
often into technology

L. Susskind

Letter of Intent for a scientific collaboration between European Underground Laboratories

In the framework of an international collaboration among European research underground laboratories and in the framework of the international effort on searches for rare events, this LoI defines the common interest of research collaboration and transnational access between the Laboratorio Nazionale del Gran Sasso (Italy), the Laboratorio Subterráneo de Canfranc (Spain), the Boulby Underground Laboratory (UK), the Laboratoire Souterrain de Modane (France), the Laboratoire Souterrain à Bass Bruit (France), and the CallioLab (Finland) to reinforce the cooperation and synergy between these research infrastructures.